REMARKS

Applicants appreciate the thorough examination of the present application as reflected in the Official Action mailed October 6, 2004. Applicants also appreciate the indication of allowance of Claims 15, 21, 22, 26, 32, 38 and 39. Applicants have amended Claims 1, 4, 12, and 83 to clarify that the shorting channels, second n-type regions and region that is configured to self-deplete are distinct regions that have higher n-type dopant concentrations than are present in the region between or adjacent them.

The IDS

Applicants wish to bring to the Examiner's attention an IDS of materials that is submitted concurrently herewith. Applicants request that the materials be considered by the Examiner and that an initialed copy of the PTO-1449 form be returned with any subsequent action.

The Section 112 Rejections

Claims 4, 25, 27-31 and 33-37 stand rejected under 35 U.S.C. § 112 first and second paragraphs. The Official Action states that "Claim 4 appears misdescriptive, because 'n-type shorting channels' 26' in Figure 7 do extend 'beyond a periphery of the p-type silicon carbide regions' 20 as n-type 'epitaxial' layer 27." Official Action, p. 2. The Official Action further states that "Claim 25, that appears directed to the embodiment of Figure 7, is inconsistent with independent claim 12, which does not appear to read on Figure 7." Official Action, p. 2. The Official Action requests that Applicants read Claim 12 on Figure 7. Official Action, p. 2.

Figure 7 is described with reference to at least two different embodiments of the present invention with respect to the epitaxial layer 27. In one of these embodiments, the shorting channels are provided by an undifferentiated epitaxial layer and in the other embodiments, the shorting channels are provided by implanting in and/or through the epitaxial layer to provide the regions 26'. See Specification, p. 16. The regions 26' are clearly illustrated as stopping at the edge of the p-type region 20 in Figure 7 and their formation is described with reference to Figure 9D.

Claim 12 includes embodiments of the present invention as illustrated in Figures 6 or 7. In particular Claim 12 recites that the second regions of n-type silicon carbide (26 or 26') have a carrier concentration less than the carrier concentration of the first regions of n-type silicon carbide (24) and extend from the first regions of n-type silicon carbide (24) to, but not substantially beyond, the peripheral edges of the first regions of p-type silicon carbide (20). In Figure 6, the second regions of n-type silicon carbide 26 do not extend substantially beyond the peripheral edges of the first regions of p-type silicon carbide 20. In Figure 7, the second regions of n-type silicon carbide 26' do not extend substantially beyond the peripheral edges of the first regions of p-type silicon carbide 20. Thus, Claim 12 includes the embodiments of Figure 6 as well as the embodiments of Figure 7 where the regions 26' are distinct from the epitaxial layer 27 of Figure 7. Thus, the specification at page 16, lines 28 and 29 states that the shorting channels 26' "preferably, may be formed by implantation in and/or through the regrown silicon carbide layer 27." Further details on how the shorting channels 26' may be formed by implantation are also provided with reference to Figure 9D and discussed at pages 21 and 22 of the present specification. Applicants have also amended Claim 12 to clarify that the second regions of n-type silicon carbide have a higher dopant concentration than the region of silicon carbide between them and, thus, are clearly directed to the embodiments in Figures 7 and 9D that have implanted regions 26' to provide a higher concentration of n-type dopants in those regions. Accordingly, Applicants submit that, as recited in Claim 12, the second regions of n-type silicon carbide are distinct regions of n-type silicon carbide that do not extend substantially beyond the periphery of the p-type silicon carbide region. Such a description is illustrated by the regions 26 in Figure 6 and the regions 26' in Figure 7. Thus, Applicants submit that there is no inconsistency between Claim 12 and the dependent claims that recite an epitaxial layer as the epitaxial layer is illustrated as the region 27 of Figure 7.

With regard to Claim 4, Applicants submit that Claim 4 is also directed to the second embodiment of Figure 7, that is also described with reference to Figure 9D, where the shorting channels are provided by an implanted region of the epitaxial layer 27, not by the undifferentiated epitaxial layer. Applicants have further amended

Claim 4 to make clear that the shorting channels have a higher n-type dopant concentration than is present in the region between the shorting channels. As such, Applicants submit that Claim 4 is consistent with Figures 7 and 9D and is not misdescriptive as Claim 4 is not directed to all of the embodiments that are discussed in the specification with reference to Figure 7 but only to those embodiments that include an implanted region in the epitaxial layer that defines the shorting channels 26' as discussed on pages 21 and 22 of the present specification with reference to Figure 9D.

The Obviousness Rejections

Claims 1, 2, 4, 6, 10-12, 17-19, 23-25, 33-36, 40, 41, 83, 84 and 89 stand rejected under 35 U.S.C. § 103 as obvious in light of United States Patent No. 6,165,822 to Okuno et al. (hereinafter "the '822 patent") and Chung et al. "Improved Inversion Channel Mobility for 4H-SiC MOSFETs Following High Temperature Anneals in Nitric Oxide" (hereinafter "Chung"). Claims 8, 9, 13, 14, 16, 27-31 and 87 stand rejected under 35 U.S.C. § 103 as obvious in light of the '822 patent, Chung and further in view of United States Patent No. 6,221,700 to Okuno et al. (hereinafter "the '700 patent"). Finally, Claims 5, 20, 37 and 88 stand rejected under 35 U.S.C. § 103 as obvious in light of the '822 patent, Chung and United States Patent No. 5,170,231 to Fuji et al. (hereinafter "the '321 patent").

Claims 1, 4, 12 and 83 are independent claims. In the interest of brevity, Applicants will not repeat the arguments presented in Applicants' previous Amendments but incorporate those arguments as if set forth fully herein. Applicants note that the Official Action does not even address Applicants' previous response.

The Official Action asserts that the '822 patent discloses the recitations of Claims 1, 4, 12 and 83 because the "'n-type shorting channels' read on inherent subportions of layer 5 in regions 3a, 3b, and the 'drift layer' reads on layer 2 plus the inherent subportion of layer 5 on layer 2." Official Action, p. 2. Applicants respectfully submit that inherency is not a concept that is appropriate in an obviousness rejection. Moreover, the Official Action arbitrarily defines regions of the structure of the '822 patent to correspond to the recitations of the claims using the

present specification as a road map. The '822 patent does not describe the layer 5 as a divided layer and mentions no "subportions." To somehow divide an undivided layer into subportions and then assert that those subportions disclose any of the recitations of the claims is improper.

For example, Claim 1 recites that the "n-type shorting channels" extend "from respective ones of the n-type silicon carbide regions through the p-type silicon carbide regions and to the n-type silicon carbide drift layer" and that they **"extend to but not into the n-type silicon carbide drift layer**." In contrast, the '822 patent describes an n-type layer that extends completely between the n+ regions 4a and 4b. To somehow arbitrarily divide this layer to read on the shorting channels that do not extend into the drift layer is to use hindsight and establish a distinction in the layer of the '822 patent that is not described in the '822 patent. This is clearly the use of hindsight. It is clear that the '822 patent did not appreciate any distinction between any portion of the layer 5.

Applicants have also amended Claim 1 to make clear that the shorting channels are distinct regions, not a continuous region. Thus, Claim 1 recites "the n-type shorting channels have a higher n-type dopant concentration than is present in a region disposed between the n-type shorting channels." Applicants submit that a continuous region does not disclose that the shorting channels have a higher n-type dopant concentration than is present in the region between the shorting channels. Accordingly, Applicants submit that Claim 1 is patentable over the cited references for at least these reasons.

Claim 4 recites "n-type shorting channels extending from respective ones of the n-type silicon carbide regions through the p-type silicon carbide regions and to the n-type silicon carbide drift layer, **the n-type shorting channels extending to but not beyond a periphery of the p-type silicon carbide regions**." Applicants submit that the '822 patent does not disclose such a relationship for reasons analogous to those discussed above with reference to Claim 1. Applicants have also amended Claim 4 to make clear that the shorting channels are distinct regions, not a continuous region. Thus, Claim 4 has been amended to recite "the n-type shorting channels have a higher n-type dopant concentration than is present in a region disposed between the n-type

shorting channels." Applicants submit that a continuous region does not disclose that the shorting channels have a higher n-type dopant concentration than is present in the region between the shorting channels. Accordingly, Applicants submit that Claim 4 is patentable over the cited references for at least these reasons.

Likewise, Claim 12 recites "second regions of n-type silicon carbide having a carrier concentration less than the carrier concentration of the first regions of n-type silicon carbide and which **extend from the first regions of n-type silicon carbide to, but not substantially beyond, the peripheral edges of the first regions of p-type silicon carbide**." As discussed above, the '822 patent describes a layer 5 that extends completely between the n+ regions 4a and 4b and extends completely across the drift layer 2. There is no discussion in the '822 patent of a region that stops at the periphery of the p-type regions 3a and 3b. To arbitrarily assert that such a region is "inherent" in the layer 5 of the '822 patent is to ignore the teachings of the '822 patent and use the present specification as a roadmap in defining regions in the structure of the '822 patent that are not described or suggested by the '822 patent itself. Claim 12 has also been amended to recite that "the second regions of n-type silicon carbide have a higher n-type dopant concentration than is present in a region disposed between the second regions of n-type silicon carbide." Applicants submit that a continuous region as described in the '822 patent does not disclose the recited relationship of dopant concentrations are recited in amended Claim 12. Accordingly, Applicants submit that Claim 12 and the claims that depend from Claim 12 are neither disclosed nor suggested by the cited references.

Claim 83 recites that "**the region that is configured to self-deplete extends to but not into the n-type silicon carbide drift layer.**" As discussed above, layer 5 of the '822 patent does not disclose a region that stops at the drift layer but describes a region that extends past the drift layer. Claim 83 has also been amended to recite that the region that is configured to self deplete "has a higher n-type dopant concentration than is present in an n-type silicon carbide region adjacent the region that is configured to self deplete." Applicants submit that a continuous region as described in the '822 patent does not disclose the recited relationship of dopant concentrations are recited in amended Claim 83. Accordingly, Applicants submit that Claim 83 and

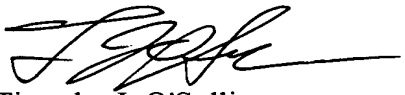
the claims that depend from Claim 83 are neither disclosed nor suggested by the cited references.

While each of the dependent claims is patentable as depending from a patentable base claim, Applicants submit that certain of the dependent claims are separately patentable over the cited references. For example, the Official Action does not even mention where in any of the cited references the recitations of, for example, Claim 25 where the shorting channels are provided by an implanted region in an epitaxial layer. Thus, Applicants submit that Claim 25 is separately patentable for at least these additional reasons.

Conclusion

Having addressed each of the issues raised in the Official Action, Applicants submit that the present application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,

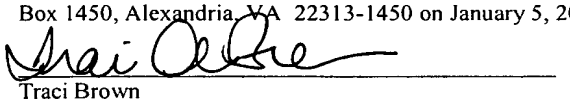


Timothy J. O'Sullivan
Registration No. 35,632

Myers Bigel Sibley & Sajovec, P.A.
P. O. Box 37428
Raleigh, North Carolina 27627
Telephone: (919) 854-1400
Facsimile: (919) 854-1401
Customer No. 20792

Certificate of Mailing under 37 CFR 1.8 (or 1.10)

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on January 5, 2005.



Traci Brown